

REMARKS

The applicants appreciate the Examiner's thorough examination of the application and request reexamination and reconsideration of the preceding amendments and the following remarks.

The Examiner rejects claims 1-34 under 35 U.S.C. §103(a) as being unpatentable over U.S. Pat. No. 5,939,726 to *Wood* in view of U.S. Pat. No. 6,133,569 to *Shoda et al.*

However, neither *Wood* nor *Shoda et al.* nor their combination teach or suggest each of the elements of the applicants' claimed invention. Moreover, the primary reference *Wood* is not properly combinable with the secondary reference *Shoda et al.* The teachings of *Wood* will be discussed first, followed by the teachings of *Shoda et al.* and a discussion why the references are not properly combinable.

Wood teaches a strip of metal foil 4 which is heated to emit infrared radiation. See, e.g. the Abstract. *Wood* further teaches the use of an inert gas for preventing oxidation of the foil element and increasing the thermal time constant of the foil. See, e.g. column 2, lines 51-61. The heated metal foil taught by *Wood* involves high thermal mass (mass that absorbs and holds heat). *Wood* teaches two pins to hold the metal foil to coil and uncoil it – a so-called “watch spring effect” – as thermal expansion and contraction of the thin foil caused by pulsing of the electrical input current is absorbed by the mechanical attachment of the foil to the support pins. See, e.g. column 2, line 62 through column 3, line 5.

In contrast to the applicants' claimed invention of claim 1, *Wood* does not teach or suggest a chamber with a plasma generating gas therein. *Wood* does not teach or suggest that the inert gas generates a plasma. In fact, *Wood* teaches away from the

applicants' claimed invention because instead of a plasma emitting infrared radiation, *Wood* teaches that the metal foil emits infrared radiation. Rather than becoming a plasma, *Wood*'s inert gas simply prevents oxidation of the foil element and decreases the thermal time constant of the foil. Also, *Wood*'s foil has high thermal mass, while with the applicant's claimed invention there is very little thermal mass because there are no heated filaments.

In further contrast to the applicant's claimed invention of claim 1, *Wood* does not teach a pair of spaced electrodes in the chamber for creating a plasma therebetween. Instead, *Wood* teaches pins physically attached to a metal foil to hold and heat the metal foil and for coil and uncoiling the metal foil. *Wood* does not teach or suggest that the pins create a plasma, from the inert gas or otherwise.

Also, *Wood* does not teach or suggest a collimating lens made of infrared radiation transmissive material disposed between the pair of electrodes, as the Examiner has also noted. Moreover, *Wood* teaches away from a collimating lens because *Wood* teaches that the infrared emitting metal foil is mounted within a deep parabolic or elliptical reflector (5) to create a reflected beam. See e.g. column 3, lines 16-19.

The secondary cited reference *Shoda et al.* also does not teach or suggest the foregoing elements. *Shoda et al.* teaches a thermal infrared camera for creating images from incident infrared radiation, and thus does not teach a high frequency radiation source at all. *Shoda et al.* also does not teach, *inter alia*, a chamber with a plasma generating gas therein or a pair of spaced electrodes in the chamber for creating a plasma therebetween. In fact, *Shoda et al.* teaches that its image pickup element is within a vacuum vessel. See elements 15 and 14 in Fig. 1 of *Shoda et al.*, for example.

The Examiner cites *Shoda et al.* for a collimating lens made of infrared radiation transmissive material. However, in contrast to the applicants' claim 1, the lens taught by *Shoda et al.* is not disposed between a pair of electrodes and a window, as *Shoda et al.* does not teach a pair of electrodes as claimed by the applicants. Also, while *Shoda et al.* teaches a lens, even then it is to focus incoming infrared radiation onto an image pickup element, not to direct emitted infrared radiation.

Also, *Shoda et al.* would not be properly combinable with *Wood* because *Wood* teaches a radiation source, while in contrast, *Shoda et al.* teaches a camera for creating images from incident infrared radiation. One would not be motivated to combine *Wood* which teaches heating a filamentous high thermal mass metal foil to emit infrared radiation, with *Shoda et al.* which teaches an infrared camera for capturing incident infrared radiation and forming images therefrom. Moreover, to the extent that these two cited references both involve infrared radiation, *Wood* teaches an inert gas in the chamber with the source of radiation (metal foil) as discussed above, while in contrast, *Shoda et al.* teaches that the image pickup element is in a vacuum vessel.

It is clear then that neither *Wood* nor *Shoda et al.* nor their combination teach or suggest each and every element of the applicants' claimed invention of claim 1, and in fact these cited references are not properly combinable.

Accordingly, the applicants' claim 1 is in condition for allowance. Also, claims 2-23 depend directly or indirectly from claim 1, are in condition for allowance for at least the foregoing reasons. Additionally, the applicants note further that with respect to certain dependent claims, those claimed elements are also not disclosed, taught or suggested by the cited references, i.e.: *Wood* does not teach xenon as a gas or a plasma

generating gas, but only suggests nitrogen and/or helium as the inert gas, the purposes of which are discussed above; *Wood* does not teach a lens, but only suggests sapphire, germanium etc. as materials for the window and filters; *Wood* does not teach a pair of posts having terminal ends which contain an electrode, but teaches only posts which are pins even at their terminal ends; and *Wood* does not teach electrodes disposed vertically, but only pins disposed horizontally.

In summary, the applicants submit that claims 1-23 are in condition for allowance.

With respect to claims 24-34, independent claim 24 recites, *inter alia*, a pair of spaced electrodes, and a gas which creates a plasma between the electrodes. As discussed above, these elements are not taught or suggested by *Wood*, *Shoda et al.*, or their combination. Additionally, neither *Wood* nor *Shoda et al.* nor their combination teach or suggest the element in claim 24 of an optical path from the plasma through the window including only materials which transmit infrared radiation. As discussed above, neither *Wood* nor *Shoda et al.* teach or suggest a plasma at all.

Accordingly, claim 24, and claims 25-34 which depend directly or indirectly from claim 24, are also in condition for allowance for at least these reasons.

The other references cited by the Examiner as pertinent to the applicants' disclosure, namely, U.S. Pat. No. 5,438,233 to *Boland* and U.S. Pat. No. 6,031,970 to *Nordal et al.*, teach almost precisely the prior art that the applicants' claimed invention improves upon. *Boland* teaches a filament lamp infrared source and not, *inter alia*, a plasma as in the applicants' claimed invention. Similarly, *Nordal et al.* teaches a thin, electrically conducting film adapted to emit radiation when heated. Both references

include filament or filament-like radiation source that is heated, and thus have high thermal mass, *inter alia*, in contrast to the applicants' claimed invention.

CONCLUSION

Each of the Examiner's rejections has been addressed or traversed. Accordingly, it is respectfully submitted that claims 1-34 are in condition for allowance. Early and favorable action is respectfully requested.

If for any reason this Response is found to be incomplete, or if at any time it appears that a telephone conference with counsel would help advance prosecution, please telephone the undersigned or his associates, collect in Waltham, Massachusetts at (781) 890-5678.

Respectfully submitted,



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